



## Training and Professional Development

# Educational Strategies to Achieve Equitable Breast Imaging Care

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### Abstract

As the population of the United States becomes increasingly diverse, radiologists must learn to both understand and mitigate the impact of health disparities. Significant health disparities persist in radiologic care, including breast imaging. Racial and ethnic minorities, women from lower socioeconomic status, those living in rural areas, and the uninsured bear a disproportionate burden of breast cancer morbidity and mortality. Currently, there is no centralized radiology curriculum focusing on breast health disparities available to residents, breast imaging fellows, or practicing breast radiologists. While patient-, provider-, and system-level initiatives are necessary to overcome disparities, our purpose is to describe educational strategies targeted to breast imaging radiologists at all levels to provide equitable care to a diverse population. These strategies may include, but are not limited to, diversifying the breast imaging workforce, understanding the needs of a diverse population, cultural sensitivity and bias training, and fostering awareness of the existing issues in screening mammography access, follow-up imaging, and clinical care.

**Key words:** health equity; education; breast imaging; health disparities.

### Introduction

In order to provide exceptional care to an increasingly diverse population, radiologists must recognize and alleviate the effect of health disparities. Health disparities are differences that exist among specific populations in the incidence, prevalence, mortality, and burden of disease and other adverse health conditions that limit the population's ability to reach full health potential (1). Health disparities may originate from systematic, unjust differences between groups and communities occupying unequal positions in society (2).

Significant evidence links economic and social disadvantage with avoidable disability, illness, and mortality (3).

Notable health disparities persist in radiologic care, including breast imaging. Minority populations face numerous barriers to receive equitable breast imaging care (Figure 1). Although the overall breast cancer mortality rate has declined over the past four decades, this trend is not observed equally in all women (4). Racial and ethnic minorities, women from lower socioeconomic backgrounds, those living in rural areas, and the uninsured bear a disproportionate

### Key Messages

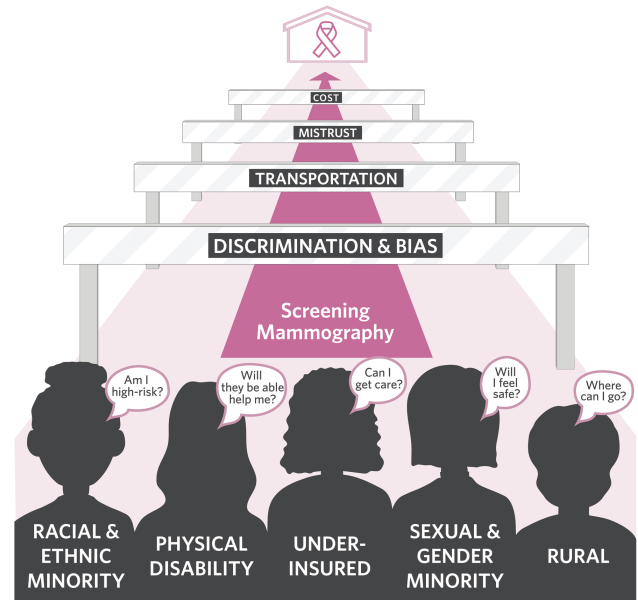
- Racial and ethnic minorities, women from lower socioeconomic status, those living in rural areas, and the uninsured bear a disproportionate burden of breast cancer morbidity and mortality.
- Understanding breast health disparities can enable radiologists to address disparities, increase access to high-quality patient-centered breast imaging care, and achieve equitable breast cancer outcomes.
- Educational strategies to mitigate the impact of health disparities include diversifying the breast imaging workforce, understanding the needs of a diverse population, cultural sensitivity and bias training, and fostering awareness of the existing issues in screening mammography access, follow-up imaging, and clinical care.

burden of breast cancer morbidity and mortality (4). The reasons for these disparities are not completely understood, although unequal access to health services, greater number of comorbid conditions, lower utilization of screening exams, and disparities in treatment likely contribute (5). Socioeconomic factors, including failure to complete high school, lower family income, and absence of continuous insurance, have been associated with lower breast cancer screening rates (6). Conflicting consensus guidelines may create provider confusion regarding appropriate screening regimens for vulnerable populations, which can result in inadequate utilization of screening mammography and higher rates of advanced breast cancer disease, resulting in breast cancer survival disparities among minority populations (7).

Currently, a centralized curriculum focusing on breast health disparities is not available to radiology residents, breast imaging fellows, or practicing breast radiologists (8). This curricular gap in breast imaging education may exacerbate disparities and diminish radiologic care. Providing current and future breast radiologists with a strong foundation in understanding breast health disparities can enable them to address these, increase access to high-quality, patient-centered breast imaging care, and ultimately achieve equitable breast cancer outcomes. Our purpose is to define existing health disparities in breast imaging care and to offer educational strategies to provide equitable care to a diverse population.

### Access and Uptake of Screening Mammography

Identifying barriers in access to screening mammography is a key step toward mitigating the impact of health disparities in breast imaging. For populations impacted by health disparities, social determinants of health serve as prevailing challenges to prioritize, access, afford, or complete breast



**Figure 1.** Common barriers minority populations may face during the breast imaging patient experience.

imaging services. Social determinants of health include, but are not limited to, financial stability, the quality and continuity of available health care, social support, childcare, reliable housing, dependable transportation, language/literacy, education, and personal risk (2). Other cited challenges may include lack of health insurance, discrimination, cultural insensitivity, and general mistrust of clinicians (9). As a result, many trends in underutilization of screening mammography have been documented.

Among racial and ethnic minority women aged 50–74, screening mammography rates are lowest in non-Hispanic American Indian/Alaska Native (AI/AN) women at 66%, compared to 74% and 73% for non-Hispanic Black and non-Hispanic White women, respectively (10,11). Compared to urban locations, women in rural locations have fewer available breast imaging facilities, which in turn leads to decreased access, longer driving distances, and below-average utilization of breast imaging services (12,13). Women with physical disabilities may struggle to arrange safe and reliable transportation to facilities equipped with adjustable mammography units that accommodate for positioning (14). Data is mixed on breast cancer screening rates among sexual minority women. While some studies demonstrate up to 78% of gay and lesbian women having had a mammogram in the past 2 years, versus 64% of straight women, other studies report lower screening mammography rates for sexual minority women (9). With an increasing number of transgender patients undergoing gender-affirming hormonal and surgical interventions, the relationship between hormone therapy and risk for developing breast cancer is not fully understood (15,16). When considering transgender women receiving hormone treatment, there remains a lack of consensus for

screening mammography guidelines, creating possible clinician and patient uncertainty (15,16).

Women impacted by health disparities often cite uncertainty regarding personal breast cancer risk and appropriate screening regimens. This confusion may be further compounded by conflicting consensus guidelines for average-risk women, with some organizations recommending biennial screening mammograms for average-risk women at age 50 and some recommending annual screening at age 40 (17). Further, the American College of Radiology and the Society of Breast Imaging recommend that all women, especially Black women and those of Ashkenazi Jewish descent, be evaluated for breast cancer risk no later than age 30 to identify women at higher risk for breast cancer. Those at higher risk can be offered early and/or supplemental screening that may include breast MRI (18). Non-Hispanic Black women are reported to have a higher breast cancer incidence rate under age 40, are at higher risk of aggressive, triple-negative breast cancers, have a higher risk of pathogenic *BRCA1* and *BRCA2* mutations, and experience mortality rates almost double that of non-Hispanic White women under age 50. Early and/or supplemental screening for these high-risk women can identify more early-stage cancers, reduce breast cancer morbidity and mortality, and narrow the existing disparity gap in breast cancer outcomes (17–19). Additionally, lesbian, gay, and bisexual women erroneously perceive their risk of developing breast cancer to be low. However, these women are more likely to either be nulliparous, have had children later in life, or suffer from comorbidities such as alcoholism and obesity, all of which are associated with increased risk of developing breast cancer (9,20). Risk assessment and risk-appropriate screening in this vulnerable population may also address existing disparities.

Underinsurance, defined as insurance coverage that does not adequately meet one's needs, primarily affects the socioeconomically disadvantaged population and includes low-income patients on Medicaid, accounting for 63 million Americans (21,22). For low-income women making minimum wage (federal minimum wage currently \$7.25/hour), out-of-pocket expenses for screening mammography can be daunting, not to mention the additional expenses and high co-payments for tomosynthesis or supplemental breast ultrasound (23). The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) and the Breast and Cervical Cancer Prevention and Treatment Act strive to increase access to screening mammography for socioeconomically disadvantaged women (24). However, 60% of low-income, uninsured, qualifying women are not screened by the NBCCEDP, as eligible women outnumber the financial capacity of the program (25). Those that are screened are often diagnosed with later-stage disease when compared to non-socioeconomically disadvantaged women with breast cancer (24).

Beyond the cost of care, low-income women cite inflexible work schedules which limit access to available screening

mammogram appointments or cause missed screening mammogram appointments (26). Additionally, low-income, uninsured women often face the financial burden of childcare costs, with an average annual expense of \$9000–\$15 000 per child in the United States (27). The cost of childcare incurred so that one can attend a screening mammography appointment combined with the out-of-pocket expense associated with a screening mammogram may serve as additional barriers for low-income, uninsured women to access cancer screening services.

### Delivery of Diagnostic Breast Imaging Services, Follow-up Care, and Cancer Treatment

Delays in diagnostic evaluation, biopsy, and medical and surgical oncologic appointments for minority populations may further exacerbate health disparities, translating to advanced breast cancer at the time of presentation and poor outcomes (11,28). Following an abnormal screening mammogram, non-Hispanic Black women are more likely to experience delays receiving follow-up imaging, on average up to 26 days, compared to 14 days for non-Hispanic White women (29). Gender and sexual minority patients may also delay follow-up imaging due to fear of discrimination or cultural insensitivity surrounding lifestyle choices (9).

These delays in care, combined with differences in treatment, are contributing factors to disparities in breast cancer outcomes. Compared to non-Hispanic White women, both non-Hispanic Black and non-Hispanic AI/AN women are more likely to present with triple-negative, stage IV breast cancer leading to higher mortality rates (11,28). Due to a combination of financial instability and provider bias, non-Hispanic Black women receive lower doses of chemotherapy, lower rates of adjuvant radiation therapy, and are less compliant with tamoxifen use (29). For example, many studies have documented that non-Hispanic Black women experience misuse and underuse of breast cancer treatment (30). Non-Hispanic Black women with stage I or II disease were 40% less likely to receive the standard of care as defined by the National Comprehensive Cancer Network. Non-Hispanic Black patients experience more frequent use of non-guideline concordant adjuvant chemotherapy regimens than non-Hispanic White patients (19% versus 11%), underuse of adjuvant treatment (34% versus 16%), lower rates of definitive local therapy (82.8% versus 86.0%), and lower chemotherapy dose proportion/relative dose intensity. These differences in treatment were not explained by tolerance of therapy, comorbidities, or leukocyte counts. More non-Hispanic Black women had chemotherapy dose reductions at the time of the first cycle of treatment, suggesting physician bias regarding the ability of these patients to tolerate treatment. Non-Hispanic Black patients were found to have significantly lower adherence to tamoxifen use compared

to non-Hispanic White patients, proposed to be related to cost (30). Non-Hispanic Black women have a 42% higher death rate related to breast cancer compared to non-Hispanic White women; however, when given equitable access to health care, death rates are similar among these populations (31).

Geographic location may further exacerbate disparities in outcomes. Despite 20% of the population residing in rural areas, only 3% of oncologists work in rural areas, highlighting scarce resources at the time of follow-up care (32). Due to geographic travel burdens, rural women are less likely to receive breast-conserving therapy for early-stage breast cancer compared to the national average, with breast-conserving therapy rates decreasing as travel distances increase (32). Due to geographic disparities, rural women also have higher rates of advanced-stage breast cancers at the time of presentation (12).

Insurance status further complicates delivery of breast imaging services, follow-up care, and cancer treatment. Although numerous state-specific Medicaid expansions have taken place since the passage of the Affordable Care Act, state economic downturns have resulted in cost-cutting measures that negatively impact the quality of health insurance plans for new Medicaid enrollees (21). As a result, uninsured and underinsured populations face disparities in the delivery of advanced breast imaging techniques, leaving this population vulnerable to delayed care and diagnosis (4). Uninsured women have higher odds of experiencing a delay in diagnostic follow-up for an abnormal screening mammogram, often exceeding the recommendations of the Centers

for Disease Control and Prevention for follow-up within 60 days (33). The socioeconomically disadvantaged population is known to experience a delay in diagnosis, with the odds of a later-stage breast cancer diagnosis and the hazard of breast cancer death higher for women with Medicaid and no insurance, compared to those with private insurance (34).

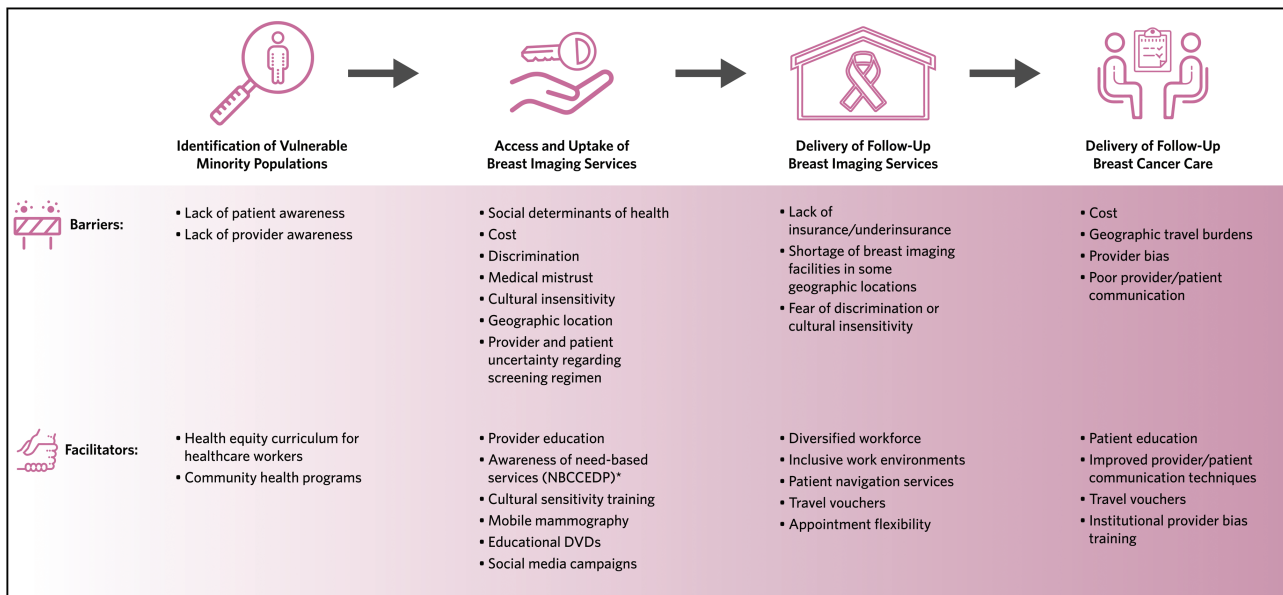
### Educational Strategies to Address Disparities in Breast Imaging and Cancer Care

Educational strategies to identify and mitigate disparities based on race, ethnicity, geographic location, gender, and socioeconomic status can address existing barriers and improve outcomes in breast imaging and cancer care (Figure 2). These strategies include (1) diversifying the breast imaging workforce through pipeline recruitment initiatives, (2) offering education to breast imaging providers on the needs of a diverse population, (3) incorporating workplace cultural sensitivity and unconscious bias training, and (4) fostering awareness of the existing issues in access to screening mammography, follow-up imaging, and clinical care.

### Diversifying the Breast Imaging Workforce

A diversified breast imaging workforce is essential to providing equitable breast imaging care to an increasingly diverse patient population (35). Currently enrolled medical students identify as 50% non-Hispanic White, 22% Asian, 7% non-Hispanic Black, and 7% Hispanic, Latino, or Spanish origin. This is inconsistent with the current United States

## Strategies to Mitigate the Impact of Health Disparities in Breast Imaging



**Figure 2.** Barriers to equitable breast imaging care and strategies to overcome these barriers. Addressing existing barriers at multiple levels can improve outcomes in breast imaging and cancer care. \*The National Breast and Cervical Cancer Early Detection Program (NBCCEDP) strives to increase access to screening mammography for socioeconomically disadvantaged women.



population, which identifies as 60% non-Hispanic White, 6% Asian, 13% non-Hispanic Black, and 18% Hispanic/Latino. In order to promote a more diverse workplace that reflects the patient population, it is critical that radiology environments are both diverse and free from hostility, exploitation, and unequal treatment. Strategies to increase diversity in the breast imaging workforce include recruiting a more diverse population of radiology residency and breast imaging fellowship applicants, recruiting and retaining diverse staff in breast imaging facilities, and promoting an inclusive workplace. An inclusive workplace environment for trainees can be fostered by investing in trainee success with the use of intentional curriculum design and knowledgeable, culturally competent faculty (35). Ultimately, these strategies encourage patient-provider commonalities and trusting relationships, with the goal of increased access and uptake of breast imaging services.

### Understanding the Needs of a Diverse Population

Healthcare providers, including breast imaging radiologists at all levels of training, need to be aware of the populations at risk for disparate outcomes, the causes and solutions for disparities in breast imaging, and the cultural needs of minority populations. Numerous educational resources are available in the medical literature and through breast cancer advocacy groups, such as the Susan G. Komen Foundation. These resources can be incorporated into breast imaging curricula to enhance patient, staff, and faculty knowledge of breast imaging disparities among different populations.

Table 1 provides educational references on disparities in breast cancer for minority populations, including racial/ethnic groups, gender and sexual minorities, and women with disabilities (11,14,17,29,36–41). These resources discuss the causes of disparities, provide educational information for patients, and offer creative solutions for clinicians to alleviate disparities. Table 2 contains resources regarding urban and rural disparities and provides techniques and possible solutions to improve breast imaging access (12,13,42–44). Table 3 contains resources for healthcare team members and patients, highlighting the screening mammography needs and preferences for gender and sexual minority populations (9,15,20,45).

### Offering Cultural Sensitivity and Bias Training

Breast imaging radiologists and trainees should consider cultural sensitivity training as a key strategy for alleviating disparities experienced by minority populations. Understanding and appreciating cultural differences and similarities among minority patients is a crucial step in building a trustworthy patient-provider relationship. In order to promote behavioral changes institutionally, imaging centers can institute cultural sensitivity training for physicians, trainees, nurses, technologists, and front-desk staff (15,16). With regard to gender and sexual minority patients, breast radiologists should understand and appropriately use transgender terminology. Breast

imaging centers can provide private changing rooms, gender-neutral bathrooms, and gender-neutral signage to promote an inclusive and respectful environment (15,16). In order to effectively address health disparities in the lesbian, gay, bisexual, transgender, queer community, clinicians require cultural sensitivity and knowledge of screening mammography regimens unique to this population (16).

Understanding conscious and unconscious biases in healthcare is critical in providing equitable care to diverse patient populations. Conscious bias is intentional. Unconscious bias, on the other hand, occurs when one unknowingly draws from assumptions or stereotypes to pass judgements and make decisions about individuals, groups, or situations (46). Unconscious biases are pervasive and often contradict the positive intentions of providers, which can lead to exacerbation of health disparities and substandard breast care. Fortunately, unconscious biases are malleable and, with intentional management, can be counterbalanced. Providers should attempt to recognize personal biases and how they affect their behaviors (46). An effective tool available for testing one's own unconscious bias is the Implicit Association Test, created and maintained by Project Implicit, which can be accessed readily online (47,48). Providers should also strive to implement evidence-based medical practices and avoid stereotypes for diverse populations, while institutions can implement formal education to lessen the effects of unconscious bias (46).

### Fostering Awareness of the Existing Issues in Access to Screening Mammography, Follow-up Imaging, and Clinical Care

Finally, breast imaging radiologists must be cognizant of the existing barriers that many populations face when attempting to access screening mammography, follow-up imaging, and cancer care for minority populations. Understanding these barriers and current strategies to address them can drive improvements in access to care. Current strategies to overcome access barriers include, but are not limited to, mobile mammography units, payment for services for socioeconomically disadvantaged populations through programs such as NBCCEDP, and patient navigation efforts. Mobile mammography services have been shown to reduce cost, decrease travel distance, and alleviate work schedule and imaging appointment barriers, subsequently providing preventative care to patients that underutilize screening mammography in rural or low socioeconomic areas (26,49). The NBCCEDP supports evidence-based clinical interventions, connecting women to community screening services and promoting policies to increase screening mammography access (50). Due to these efforts, over a recent five-year period, the NBCCEDP has funded screening mammograms for low-income, uninsured/underinsured women, with 64% of participants identifying as Hispanic, Non-Hispanic Black, AI/AN, or Asian/Pacific Islander (50). The Center for Medicare and Medicaid Services has aimed to address socioeconomic and

**Table 1.** Resources for Disparities in Screening Mammography Among Minority Populations

Population	Reference	Summary
Non-Hispanic Black women	A perfect storm: highlighting breast cancer disparities among African-American women (29)	Comprehensive informational packet reviewing how breast cancer affects Non-Hispanic Black women differently, as well as discussion of the factors affecting their access and utilization of screening mammography
	Perspectives of low-income African American women non-adherent to mammography screening: the importance of information, behavioral skills, and motivation (37)	Discussion of barriers Non-Hispanic Black women face with regard to screening mammography. Explores women's motivations to get or not get screening mammography.
	Mammography adherence in African American women: results of a randomized controlled trial (38)	Discussion of interventions that can be taken by physicians to help increase screening mammography adherence in Non-Hispanic Black women
	Evaluation of triple-negative breast cancer early detection via mammography screening and outcomes in African American and White American patients (39)	Discussion of the reasons for increased mortality in non-Hispanic Black women compared to non-Hispanic White women with triple-negative breast cancer. Further discussion of the value of screening mammography in addressing these disparities.
Hispanic/Latina women	Systematic review of mammography screening educational interventions for Hispanic women in the United States (40)	Review of the causes of disparities for Hispanic/Latina women and the educational interventions that can be undertaken to lessen these disparities
Native American/ Native Alaskan women	Conducting a formative evaluation of an intervention promoting mammography screening in an American Indian Community: the Native Women's Health Project (11)	Insight into existing disparities for the Native American community with regard to breast cancer (more aggressive forms common and late-stage diagnosis) and barriers this population faces in accessing and utilizing screening mammography
Racial/ethnic minority populations	Race/ethnicity and age distribution of breast cancer diagnosis in the United States (17)	Discussion of the U.S. Preventative Services Task Force recommendations for breast cancer screening and racial disparities
	Facts for life: racial and ethnic differences (36)	Discussion of disparities in screening mammography and breast cancer care for ethnic minorities and the uninsured. Figures and links to other resources. Useful for patient education.
	Barriers to mammography screening among racial and ethnic minority women (41)	Comprehensive discussion of social and psychological barriers minority women face when accessing screening mammography
Women with disabilities	Facts for life: women with disabilities (14)	Review of disparities women with disabilities face with regard to screening mammography and how to assist these patients. Useful for patient education.

**Table 2.** Resources for Disparities in Screening Mammography Among Rural Populations

Reference	Summary
Rural-urban disparities in access to breast cancer screening: a spatial clustering analysis (12)	Discussion of rural-urban differences in access to screening mammography in rural Nebraska
Geographic access to mammography facilities and frequency of mammography screening (13)	Discussion of geographic barriers and how they affect screening mammography uptake in the urban and rural settings
Using Facebook to communicate mammography messages to rural audiences (42)	Discussion of using social media campaigns to engage rural communities in screening mammography practices
Mobile mammography participation among medically underserved women: a systematic review (43)	Discussion of mobile mammography effectiveness for screening minority and socioeconomic disadvantaged populations
US urban-rural disparities in breast cancer-screening practices at the national, regional, and state level, 2012–2016 (44)	Discussion of urban-rural disparities in breast cancer screening practices at the national, regional, and state levels

**Table 3.** Resources for Disparities in Screening Mammography Among LGBTQI Populations

Reference	Summary
Facts for life: lesbian, gay, bisexual, transgender, and questioning/queer people (9)	Comprehensive informational packet reviewing breast cancer risk and screening mammography rates of LGBTQI patients
Breast imaging in transgender patients: what the radiologist should know (15)	Discussion defining appropriate terminology, breast cancer risk, screening mammography protocols, and special considerations with respect to the transgender population
Breast imaging of transgender individuals: a review (16)	Discussion of radiographic imaging for transgender individuals and considerations for providing culturally sensitive care
Breast cancer risk in sexual minority women during routine screening at an urban LGBT health center (20)	Discussion of breast cancer risk among sexual minority patients
Breast cancer screening in transgender patients: findings from the 2014 BRFSS survey (45)	Discussion of transgender screening mammography trends

Abbreviations: BRFSS, behavioral risk factor surveillance system; LGBT, lesbian, gay, bisexual, transgender; LGBTQI, lesbian, gay, bisexual, transgender, queer or questioning, and intersex.

geographic barriers by investing in the Accountable Health Community model, which provides funding to its beneficiaries for housing, food, and transportation (51). Patient navigation programs in low-income communities have demonstrated meaningful impact in addressing disparities, with a program in Harlem improving 5-year breast cancer survival rates from 39% to 70% (19). Efforts to mitigate disparities surrounding follow-up imaging and cancer care have included multisystem strategies to address the individual, social support, organization, and community levels, such as the use of educational DVDs and Spanish-speaking “community health workers”, or promotoras (11,38,40,52).

## Conclusion

Consideration of the cultural, social, and economic environment of an individual and how this may affect an individual's access to and use of the healthcare system is vital in addressing health disparities and increasing appropriate and equitable breast cancer imaging practices (53). Radiologic leaders and educators must be deliberate in assigning importance to health equity. Education in cultural competency and unconscious bias, understanding the underlying causes of disparities, and strategies to improve diversity to both our applicant pool and workforce are vital components in achieving equitable health care (8,46). Improving radiologists' understanding of health equity principles can empower them to address health outcome disparities with an ultimate goal of achieving equitable, patient-centered breast imaging care.

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## Conflict of Interest Statement

None declared.

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